

Infection prevention and control during health care when novel coronavirus (nCoV) infection is suspected

Interim guidance

25 January 2020



Introduction

This is the first edition of guidance on infection prevention and control (IPC) strategies for use when infection with a novel coronavirus (2019-nCoV) is suspected. It has been adapted from WHO's *Infection prevention and control during health care for probable or confirmed cases of Middle East respiratory syndrome coronavirus (MERS-CoV) infection*,¹ based on current knowledge of the situation in China and other countries where cases were identified and experiences with severe acute respiratory syndrome (SARS)-CoV and MERS-CoV.²

WHO will update these recommendations as new information becomes available.

This guidance is intended for healthcare workers (HCWs), healthcare managers and IPC teams at the facility level but it is also relevant for the national and district/provincial level. Full guidelines are available from WHO.²

Principles of IPC strategies associated with health care for suspected nCoV infection

To achieve the highest level of effectiveness in the response to an 2019-nCoV outbreak using the strategies and practices recommended in this document, an IPC programme with a dedicated and trained team or at least an IPC focal point should be in place and supported by the national and facility senior management.³ In countries where IPC is limited or inexistent, it is critical to start by ensuring that at least *minimum requirements* for IPC are in place as soon as possible, both at the national and facility level, and to gradually progress to the full achievement of all requirements of the IPC core components according to local priority plans.⁴

IPC strategies to prevent or limit transmission in healthcare settings include the following:

1. ensuring triage, early recognition, and source control (isolating patients with suspected nCoV infection);
2. applying standard precautions for all patients;
3. implementing empiric additional precautions (droplet and contact and, whenever applicable, airborne precautions) for suspected cases of nCoV infection;
4. implementing administrative controls;
5. using environmental and engineering controls.

1. Ensuring triage, early recognition, and source control

Clinical triage includes a system for assessing all patients at admission allowing early recognition of possible 2019-nCoV infection and immediate isolation of patients with suspected nCoV infection in an area separate from other patients (source control). To facilitate the early identification of cases of suspected nCoV infection, healthcare facilities should:

- encourage HCWs to have a high level of clinical suspicion;
- establish a well-equipped triage station at the entrance of health care facility, supported by trained staff;
- institute the use of screening questionnaires according to the updated case definition ([https://www.who.int/publications-detail/global-surveillance-for-human-infection-with-novel-coronavirus-\(2019-ncov\)](https://www.who.int/publications-detail/global-surveillance-for-human-infection-with-novel-coronavirus-(2019-ncov))) and
- post signs in public areas reminding symptomatic patients to alert HCWs.

The promotion of hand hygiene and respiratory hygiene are essential preventive measures.

2. Applying standard precautions for all patients

Standard precautions include hand and respiratory hygiene, the use of appropriate personal protective equipment (PPE) according to risk assessment, injection safety practices, safe waste management, proper linens, environmental cleaning and sterilization of patient-care equipment.

Ensure that the following respiratory hygiene measures are used:

- ensure that all patients cover their nose and mouth with a tissue or elbow when coughing or sneezing;
- offer a medical mask to patients with suspected 2019-nCoV infection while they are in waiting/public areas or in cohorting rooms;
- perform hand hygiene after contact with respiratory secretions.

HCWs should apply the WHO's My 5 Moments for Hand Hygiene approach before touching a patient, before any clean or aseptic procedure is performed, after exposure to body fluid, after touching a patient, and after touching a patient's surroundings.⁵

- hand hygiene includes either cleansing hands with an alcohol-based hand rub (ABHR) or with soap and water;
- alcohol-based hand rubs are preferred if hands are not visibly soiled;
- wash hands with soap and water when they are visibly soiled.

The rational, correct, and consistent use of PPE also helps to reduce the spread of pathogens. The use of PPE effectiveness strongly depends on adequate and regular supplies, adequate staff training, appropriate hand hygiene and specifically appropriate human behaviour.^{2,5,6}

It is important to ensure that environmental cleaning and disinfection procedures are followed consistently and correctly. Thoroughly cleaning environmental surfaces with water and detergent and applying commonly used hospital-level disinfectants (such as sodium hypochlorite) are effective and sufficient procedures.⁷ Medical devices and equipment, laundry, food service utensils and medical waste should be managed in accordance with safe routine procedures.^{2,8}

3. Implementing empiric additional precautions

3.1 Contact and droplet precautions

- in addition to using standard precautions, all individuals, including family members, visitors and HCWs, should use contact and droplet precautions before entering the room where suspected or confirmed nCoV patients are admitted;
- patients should be placed in adequately ventilated single rooms. For general ward rooms with natural ventilation, adequate ventilation is considered to be 60 L/s per patient;⁹
- when single rooms are not available, patients suspected of being infected with nCoV should be grouped together;
- all patients' beds should be placed at least 1 m apart regardless of whether they are suspected to have nCoV infection;
- where possible, a team of HCWs should be designated to care exclusively for suspected or confirmed cases to reduce the risk of transmission;
- HCWs should use a medical mask^a (for specifications, please see references 2);
- HCWs should wear eye protection (goggles) or facial protection (face shield) to avoid contamination of mucous membranes;
- HCWs should wear a clean, non-sterile, long-sleeved gown;
- HCWs should also use gloves;
- the use of boots, coverall and apron is not required during routine care;
- after patient care, appropriate doffing and disposal of all PPE's and hand hygiene should be carried out.^{5,6} Also, a new set of PPE's is needed, when care is given to a different patient;
- equipment should be either single-use and disposable or dedicated equipment (e.g., stethoscopes, blood pressure cuffs and thermometers). If equipment needs to be shared among patients, clean and disinfect it between use for each individual patient (e.g., by using ethyl alcohol 70%);⁸

- HCWs should refrain from touching eyes, nose or mouth with potentially contaminated gloved or bare hands;
- avoid moving and transporting patients out of their room or area unless medically necessary. Use designated portable X-ray equipment and/or other designated diagnostic equipment. If transport is required, use predetermined transport routes to minimize exposure for staff, other patients and visitors, and have the patient using a medical mask;
- ensure that HCWs who are transporting patients perform hand hygiene and wear appropriate PPE as described in this section;
- notify the area receiving the patient of any necessary precautions as early as possible before the patient's arrival;
- routinely clean and disinfect surfaces which the patient is in contact;
- limit the number of HCWs, family members and visitors who are in contact with a suspected and confirmed 2019-nCoV patient;
- maintain a record of all persons entering the patient's room, including all staff and visitors.

3.2 Airborne precautions for aerosol-generating procedures

Some aerosol-generating procedures have been associated with an increased risk of transmission of coronaviruses (SARS-CoV and MERS-CoV), such as tracheal intubation, non-invasive ventilation, tracheotomy, cardiopulmonary resuscitation, manual ventilation before intubation, and bronchoscopy.^{10,11}

Ensure that HCWs performing aerosol-generating procedures:

- perform procedures in an adequately ventilated room – that is, natural ventilation with air flow of at least 160 L/s per patient or in negative pressure rooms with at least 12 air changes per hour and controlled direction of air flow when using mechanical ventilation;⁹
- use a particulate respirator at least as protective as a US National Institute for Occupational Safety and Health (NIOSH)-certified N95, European Union (EU) standard FFP2, or equivalent.^{2,12} When HCWs put on a disposable particulate respirator, they must always perform the seal check.¹² Note that if the wearer has facial hair (i.e., a beard) it may prevent a proper respirator fit;¹²
- use eye protection (i.e., goggles or a face shield);
- wear a clean, non-sterile, long-sleeved gown and gloves. If gowns are not fluid resistant, HCWs should use a waterproof apron for procedures expected to have high volumes of fluid that might penetrate the gown;²

^a Medical masks are surgical or procedure masks that are flat or pleated (some are like cups); they are affixed to the head with straps²

- limit the number of persons present in the room to the absolute minimum required for the patient's care and support.

4. Implementing administrative controls

Administrative controls² and policies for the prevention and control of transmission of 2019-nCoV infections within the healthcare setting include, but may not be limited to: establishing sustainable IPC infrastructures and activities; educating patients' caregivers; developing policies on the early recognition of acute respiratory infection potentially caused by 2019-nCoV; ensuring access to prompt laboratory testing for identification of the etiologic agent; preventing overcrowding, especially in the emergency department; providing dedicated waiting areas for symptomatic patients; appropriately isolating hospitalized patients; ensuring adequate supplies of PPE; ensure the adherence of IPC policies and procedures for all facets of health care.

4.1. Administrative measures related to healthcare workers

- provision of adequate training for HCWs;
- ensuring an adequate patient-to-staff ratio;
- establishing a surveillance process for acute respiratory infections potentially caused by nCoV among HCWs;
- ensuring that HCWs and the public understand the importance of promptly seeking medical care;
- monitoring HCW compliance with standard precautions and providing mechanisms for improvement as needed.

5. Using environmental and engineering controls

These controls address the basic infrastructure of the health care facility.¹³ These controls aim to ensure there is adequate ventilation⁹ in all areas in the healthcare facility, as well as adequate environmental cleaning.

Additionally, spatial separation of at least 1 meter should be maintained between all patients. Both spatial separation and adequate ventilation can help reduce the spread of many pathogens in the healthcare setting.¹⁴

Ensure that cleaning and disinfection procedures are followed consistently and correctly.⁸ Cleaning environmental surfaces with water and detergent and applying commonly used hospital disinfectants (such as sodium hypochlorite) is an effective and sufficient procedure.⁷ Manage laundry, food service utensils and medical waste in accordance with safe routine procedures.

Duration of contact and droplet precautions for patients with nCoV infection

Standard precautions should be applied at all times. Additional contact and droplet precautions should continue until the patient is asymptomatic. More comprehensive information about the mode of 2019-nCoV infection transmission is required to define the duration of additional precautions.

Collecting and handling laboratory specimens from patients with suspected 2019-nCoV infection

All specimens collected for laboratory investigations should be regarded as potentially infectious. HCWs who collect, handle or transport any clinical specimens should adhere rigorously to the following standard precaution measures and biosafety practices to minimize the possibility of exposure to pathogens.^{15,16,17}

- ensure that HCWs who collect specimens use appropriate PPE (i.e., eye protection, a medical mask, a long-sleeved gown, gloves). If the specimen is collected with an aerosol-generating procedure, personnel should wear a particulate respirator at least as protective as a NIOSH-certified N95, an EU standard FFP2, or the equivalent;
- ensure that all personnel who transport specimens are trained in safe handling practices and spill decontamination procedures;⁷
- place specimens for transport in leak-proof specimen bags (i.e., secondary containers) that have a separate sealable pocket for the specimen (i.e., a plastic biohazard specimen bag), with the patient's label on the specimen container (i.e., the primary container), and a clearly written laboratory request form;
- ensure that laboratories in health care facilities adhere to appropriate biosafety practices and transport requirements, according to the type of organism being handled;
- deliver all specimens by hand whenever possible. DO NOT use pneumatic-tube systems to transport specimens;
- document clearly each patient's full name, date of birth and suspected nCoV of potential concern on the laboratory request form. Notify the laboratory as soon as possible that the specimen is being transported.

Recommendation for outpatient care

The basic principles of IPC and standard precautions should be applied in all health care facilities, including outpatient care and primary care. For 2019-nCoV infection, the following measures should be adopted:

- triage and early recognition;
- emphasis on hand hygiene, respiratory hygiene and medical masks to be used by patients with respiratory symptoms;
- appropriate use of contact and droplet precautions for all suspected cases;
- prioritization of care of symptomatic patients;
- when symptomatic patients are required to wait, ensure they have a separate waiting area;
- educate patients and families about the early recognition of symptoms, basic precautions to be used and which health care facility they should refer to.

Acknowledgements

The original version of the MERS-CoV IPC guidance¹ was developed in consultation with WHO's Global Infection Prevention and Control Network and Emerging Diseases Clinical Assessment and Response Network, and other international experts. WHO thanks those who were involved in developing and updating the IPC documents for MERS-CoV.

This document was developed in consultation with the WHO Global Infection Prevention and Control Network and other international experts. WHO thanks the following individuals for providing review (in alphabetical order):

- Abdullah M Assiri, Director General, Infection Control, Ministry of Health, Saudi Arabia
- Michael Bell, Deputy Director of Division of Healthcare Quality Promotion, Centers for Disease Control and Prevention, Atlanta, USA
- Gail Carson, ISARIC Global Support Centre, Director of Network Development, Consultant in Infectious Diseases & Honorary Consultant Public Health England, United Kingdom
- John M Conly, Department of Medicine, Microbiology, Immunology and Infectious Diseases, Calvin, Phoebe and Joan Synder Institute for Chronic Diseases, Faculty of Medicine, University of Calgary, Calgary, Canada
- Barry Cookson, Division of Infection and Immunity, University College, London, United Kingdom
- Babacar N Doye, Board Member, Infection Control Network, Dakar, Senegal
- Kathleen Dunn, Manager, Healthcare Associated Infections and Infection Prevention and Control Section, Centre for Communicable Disease Prevention and Control, Public Health Agency of Canada
- Dale Fisher, Global Outbreak Alert and Response Network steering committee
- Fernanda Lessa, Epidemiologist, Division of Healthcare Quality Promotion, Centers for Disease Control and Prevention, Atlanta, USA.
- Moi Lin Ling, Director, Infection Control Department, Singapore General Hospital, Singapore and President of Asia Pacific Society of Infection Control (APSIC)
- Fernando Otaiza O'Ryan, Head, National IPC Program Ministry of Health, Santiago, Chile
- Diamantis Plachouras, Unit of Surveillance and Response Support, European Centre for Disease Prevention and Control
- Wing Hong Seto, Department of Community Medicine, School of Public Health, University of Hong Kong, Hong Kong, People's Republic of China
- Nandini Shetty, Consultant Microbiologist, Reference Microbiology Services, Colindale, Health Protection Agency, United Kingdom

WHO: Benedetta Allegranzi, April Baller, Ana Paula Coutinho, Janet Diaz, Christine Francis, Maria Clara Padoveze, Joao Paulo de Toledo, Maria Van Kerkhove

1. Infection prevention and control during health care for probable or confirmed cases of Middle East respiratory syndrome coronavirus (MERS-CoV) infection: interim guidance, updated October 2019. Geneva: World Health Organization; 2019 (WHO/MERS/IPC/15.1 Rev. 1; <https://apps.who.int/iris/handle/10665/174652>, accessed 17 January 2020).
2. Infection prevention and control of epidemic- and pandemic-prone acute respiratory infections in health care: WHO guidelines. Geneva: World Health Organization; 2014 (<http://apps.who.int/iris/10665/112656/>, accessed 17 January 2020).
3. Guidelines on core components of infection prevention and control programmes at the national and acute health care facility level. Geneva: World Health Organization; 2016. (Available at: <https://www.who.int/gpsc/ipc-components-guidelines/en/>, accessed 20 January 2020).
4. Minimum requirements for infection prevention and control. Geneva: World Health Organization; 2019. (Available at: <https://www.who.int/infection-prevention/publications/min-req-IPC-manual/en/>, accessed 20 January 2020).
5. WHO guidelines on hand hygiene in health care: first global patient safety challenge – clean care is safer care. Geneva: World Health Organization; 2009 (<https://apps.who.int/iris/handle/10665/44102>, accessed 17 January 2020).
6. How to put on and take off personal protective equipment (PPE). Geneva: World Health Organization; 2008 (<http://www.who.int/csr/resources/publications/putontakeoffPPE/en/>, accessed 17 January 2020).
7. CDC and ICAN. Best Practices for Environmental Cleaning in Healthcare Facilities in Resource-Limited Settings. Atlanta, GA: US Department of Health and Human Services, CDC; Cape Town, South Africa: Infection Control Africa Network; 2019. (Available at: <https://www.cdc.gov/hai/prevent/resource-limited/environmental-cleaning.html> and <http://www.icanetwork.co.za/ican guideline2019/>, accessed 20 January 2020)
8. Decontamination and Reprocessing of Medical Devices for Health-care Facilities. Geneva: World Health Organization; 2016 (Available at: <https://www.who.int/infection-prevention/publications/decontamination/en/>, accessed 20 January 2020)
9. Atkinson J, Chartier Y, Pessoa-Silva CK, Jensen P, Li Y, Seto WH, editors. Natural ventilation for infection control in health-care settings. Geneva: World Health Organization; 2009 (<https://apps.who.int/iris/handle/10665/44167>, accessed 17 January 2020).
10. Hui DS. Epidemic and emerging coronaviruses (severe acute respiratory syndrome and Middle East respiratory syndrome). Clin Chest Med. 2017;38:71–86. doi:10.1016/j.ccm.2016.11.007.
11. Tran K, Cimon K, Severn M, Pessoa-Silva CL, Conly J. Aerosol generating procedures and risk of transmission of acute respiratory infections to healthcare workers: a systematic review. PLoS One. 2012;7:e35797. doi:10.1371/journal.pone.0035797. Epub 2012 Apr 26.
12. How to perform a particulate respirator seal check. Geneva: World Health Organization; 2008

References

- (<http://www.who.int/csr/resources/publications/respiratorsealcheck/en/>, accessed 17 January 2020). For the latest information, please consult the WHO coronavirus webpage at http://www.who.int/csr/disease/coronavirus_infections/en/.
13. Adams J, Bartram J, Chartier Y, editors. Essential environmental health standards in health care. Geneva: World Health Organization; 2008 (<https://apps.who.int/iris/handle/10665/43767>, accessed 17 January 2020).
 14. Jefferson T, Del Mar CB, Dooley L, Ferroni E, Al-Ansary LA, Bawazeer GA et al. Physical interventions to interrupt or reduce the spread of respiratory viruses. Cochrane Database Syst. Rev. 2011, 7:CD006207. Available at <http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD006207.pub4/abstract;jsessionid=074644E776469A4CFB54F28D01B82835.d03t02>, accessed 17 January 2020).
 15. Laboratory testing for 2019 novel coronavirus (2019-nCoV) in suspected human cases: interim guidance January 2020. Geneva: World Health Organization (<https://www.who.int/health-topics/coronavirus/laboratory-diagnostics-for-novel-coronavirus> accessed 20 January 2020)
 16. Laboratory testing for Middle East respiratory syndrome coronavirus: interim guidance (revised), January 2018. Geneva: World Health Organization; 2018 (<https://apps.who.int/iris/bitstream/handle/10665/259952/WHO-MERS-LAB-15.1-Rev1-2018-eng.pdf?sequence=1>, accessed 17 January 2020).
 17. Laboratory biosafety manual, third edition. Geneva: World Health Organization; 2004 (<https://apps.who.int/iris/handle/10665/42981>, accessed 17 January 2020).
- WHO continues to monitor the situation closely for any changes that may affect this interim guidance. Should any factors change, WHO will issue a further update. Otherwise, this interim guidance document will expire 2 years after the date of publication.

ISBN 978-92-4-000091-9 (electronic version)

ISBN 978-92-4-000092-6 (print version)

© **World Health Organization 2020**. Some rights reserved. This work is available under the [CC BY-NC-SA 3.0 IGO](https://creativecommons.org/licenses/by-nc-sa/3.0/) licence.

